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The Great Swamp

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The Great Swamp is in the town of South Kingstown in southern Rhode Island, near the village of West Kingston. About 1.5 miles west of the West Kingston rotary on the South County Trail (State Route 2) a sign has been erected in commemoration of the Great Swamp Fight. This sign proclaims that "Three-quarters of a mile to the southward on an island in the Great Swamp the Narragansett Indians were decisively defeated by the united forces of the Massachusetts Bay, Connecticut and Plymouth Colonies, Sunday, December 19, 1675." This battle broke the resistance of the Indians under King Philip, and is responsible for the swamp often being called King Philip's Swamp. The region is approximately ten square miles in area. This figure includes all that land within the encircling one hundred foot contour line, omitting most of the extensions of the swamp along the tributaries, and including that high land known as Great Neck which extends from the north to the margin of Worden's Pond. The highest point on Great Neck is 155 feet, and the lowest elevation is 94 feet at Worden's Pond in the south. From the center of Worden's Pond to the center of Larkin's Pond in the northeast corner of the swamp, a straight-line distance of about 2.5 miles, the increase in elevation is one foot. Between the lowest and highest points of this general area there is a wide diversity of habitat, affording the botanical explorer an ever-changing shift of scenes.

Worden's Pond is the largest body of fresh water in Rhode Island. With an expanse of some 1,400 acres the average depth is about 3.5 feet. In many places a luxuriant growth of Juncus-

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Scirpus-Xyris extends for several hundred yards from shore, and occurs in scattered stands over the surface of the pond. Wading through the shallows one finds such characteristic aquatics as *Castalia odorata, Nymphaea advena, Hydrocotyle umbellata, Eriocaulon articulatum, Lobelia Dortmanna, Sabatia dodecandra, Decodon verticillatus, Gratiola aurea, Hypericum virginicum, Lacnanthes tinctoria, Pontederia cordata,* and species of Sagittaria, Utricularia, and Cicuta. There is one small island with a single red maple tree and a thick covering of button bush. During periods of high water the island is practically submerged. The pond is a favorite feeding ground for herons and migratory and indigenous ducks. The tree and shrub complex along the margins of the pond depends primarily upon the elevation. Characteristic associations are described later in this paper.

Larkin's Pond has much the same flora as Worden's Pond, although to a lesser degree, as there is much less shallow water. Depths of eight to ten feet are common. Although the old topographic sheet indicates a tributary, today there is no inlet or outlet.

Of the various streams which flow through the swamp the Chipuxet River is typical. Canoe travel is interesting largely because of the difficulties encountered. In places the rushes, sedges, water lilies, Potamogetons, and bladderwort grow so luxuriantly that the canoe must be poled or carried. Tortuous bends where the overhanging shrubs are covered with poison ivy add to the difficulties. At places the stream spreads out to such an extent that discovering the main channel is largely guess work. An apparently open stretch of water may end in a mud bank. Pickerel weed, bur-reed, *Iris versicolor* and *Iris pseudacorus* are among the more conspicuous of the aquatics along the margins with here and there the cardinal flower prominent with its brilliant splash of color. Rather profuse stands of wild rice probably account for this being a favorite breeding and feeding ground for ducks. Occasionally the stream is almost obscured where the arching swamp loosestrife grows from either bank. This loosestrife seems to be a favored host for dodder. The stream meanders through the Typha-Phragmites marshes, the typical lowland shrub complex, the more open rush-sedge-grass wet meadows, and empties into the northeast point of Worden's Pond.

Pools of various sizes, depth, and degree of permanence are found throughout the lowland area. In addition to the aquatics

previously mentioned, many of these small bodies of water may contain practically pure stands of *Dulichium arundinaceum, Woodwardia virginica, Equisetum fluviatile,* or *Proserpinaca palustris.* Where the water is deeper and bottom attached plants are less in number, *Nymphoides lacunosum* may grow so thickly that the surface of the water is practically obscured. Other pools, particularly those that are more or less seasonal, have a ground covering of sphagnum or sphagnum-cranberry. Commonly associated plants in these boggy areas are *Sarracenia purpurea, Pogonia ophioglossoides, Drosera rotundifolia, Eriophorum virginicum, Eriophorum tenellum,* and *Lycopodium inundatum.* Many of these sphagnum areas have extended over water and muck of considerable depth, furnishing good examples of quaking bogs. Jumping up and down on the sphagnum sets up undulations capable of shaking sizeable shrubs some distance away. Usually the first shrub to become established in these bogs is *Chamaedaphne calyculata.*

In the submerged lowlands the royal fern is usually the first conspicuous plant to become established on the hummocks, and is followed by various shrubs. As the bottom gradually builds up, the shrubs become the dominant growth. Representative specimens in this complex are *Vaccinium corymbosum, Rhododendron viscosum, Clethra alnifolia, Lyonia ligustrina, Viburnum cassinoides, Alnus incana, Ilex glabra, Ilex verticillata, Chamaedaphne calyculata,* and *Salix candida.* The denseness of the growth coupled with insecure footing in water, muck, or loose sphagnum, makes travel through these areas exceedingly strenuous. Even when following the numerous deer trails that interlace the area, progress is none too easy.

Occasional trees that follow the shrubs are usually red maple, black gum, Chamaecyparis, white pine, or oaks. This first invasion of trees is not always successful. As one walks northeast along the railroad from Kenyon he may get the impression that fire had swept the area, an impression belied by the fact that with the exception of the hummocks this region is in most places waist deep with water. The scattered skeletons of dead trees are more probably the result of a period of unusually high water following a rather prolonged period in which the water table was sufficiently low to provide for the aeration of the roots of the trees which had become established on higher ground. However, there are extensive tracts where the

dominant growth is forest. Roughly, this forest covering may be divided into four general types in which the dominant trees are: (1) *Chamaecyparis thyoides,* (2) red maple, (3) white pine, and (4) oaks.

The most extensive Chamaecyparis bog in the northeastern section of the Great Swamp was largely cut over in 1927 and 1928. Several rather inaccessible areas were left untouched, so that it is possible to study the original cover as well as the succession since deforestation. A pure stand of Chamaecyparis has a second-story growth made up almost entirely of *Rhododendron maximum.* These old bushes have in many cases reached a height of twelve to fifteen feet, and grow so thickly tangled that progress through them becomes a scramble through, over, and under the low spreading branches, with a slip into fairly deep sphagnum pockets enlivening the struggle. Inkberry is another prominent undershrub in this habitat. Cinnamon fern, more than head high in late summer, is the most conspicuous ground cover with *Chiogenes hispidula* rather abundant on the elevated hummocks at the bases of the cedars.

That portion of the cedar bog which was cut over about thirteen or fourteen years ago is interesting in that the swamp white cedar is succeeding itself. A thick growth of head-high cedar is the dominant cover, the only other tree seedlings at all conspicuous being red maple and yellow birch. Several shrubs are also established, but this shrub growth has a different aspect from that previously described. *Rhododendron maximum, Nemopanthus mucronata,* and *Rhus vernix* are as conspicuous here as they are inconspicuous in those areas not succeeding Chamaecyparis. The old slashings are now almost completely covered with sphagnum moss, in places still insufficiently thick to prevent one from breaking through and falling down into a tree top. *Calopogon pulchellus, Pogonia ophioglossoides, Drosera rotundifolia, Cornus canadensis, Clintonia borealis, Viola blanda, Coptis trifolia, Habenaria blephariglottis,* and *Sarracenia purpurea* are some of the herbaceous representatives of the ground cover.

White pine is an isolated tree throughout the lowlands, and in various areas is the dominant tree growth. Near the cedar bog just described there are several acres in which white pine has apparently succeeded Chamaecyparis. This general area is rather flat with the cedar sparsely scattered in the ditch like gullies from one to two feet lower than the general level occupied by the taller

white pine. Here rhododendron is again the conspicuous undershrub. This white pine stand has a different aspect from that found on higher, better drained land where the pines grow so thickly that there is practically no undergrowth. The lowland pines have an extensive admixture of broad leaved trees, particularly red maple and yellow birch. The hurricane of the fall of 1938 materially affected the white pine stands. Those in the lowlands were decimated by being blown over, the roots in the saturated soil providing insufficient anchorage to resist the high wind velocities. Many of the upland pines were either broken off, or had the foliage burned by the wind and the salt spray to such an extent that the trees failed to recover. It will be interesting to note in the future how this damage by the hurricane will affect the succession on those areas where the white pine previously was dominant.

Probably the most characteristic tree cover from the viewpoint of area covered is the red maple. This cover varies from thick, pure stands to the more open, scattered cover throughout the marsh lands, where the typical shrub complex and marsh vegetation has not yet given way to a forest canopy. The trunks of many of the trees are covered with a thick growth of Usnea.

At a slightly higher elevation than that of the red maple the typical tree cover is made up primarily of a mixture of white, black, red, swamp white, and pin oaks, with an admixture of red maple, yellow birch, white ash, black gum, and white pine. The American holly which is found scattered throughout the area is more common in this particular association. Witch hazel and spice bush are additions to the scattered representatives of the usual swamp shrub mixture. Rhododendron is conspicuous in the shallow ravines. Whereas sphagnum is the principal ground cover in the lower, more open areas, the floor of the woods in the better drained areas contains such representative plants as *Maianthemum canadense, Aralia nudicaulis, Trientalis americana, Panax trifolium, Mitchella repens, Arisaema triphyllum, Lycopodium obscurum,* and a few scattered specimens of *Trillium undulatum.*

In the sharp contrast to the luxuriant cover of the wet areas there are extensive tracts of infertile, sandy soil which may be so dry that the only ground cover is reindeer moss. The first adventive into this cover is usually *Andropogon scoparius.* Typical shrubs which follow are *Arctostaphylos Uva-ursi, Kalmia angustifolia, Myrica asplenifolia, Myrica carolinensis,* and *Juniperus communis.*

Where these meadows dip toward swamp level, areas with a higher moisture and humus content in the soil, *Aletris farinosa* and *Habenaria ciliaris* are conspicuous. The Andropogon-low shrub areas may be succeeded by an open stand of pitch pine or red cedar, or a mixture of both. On the other hand the succession may lead to the blueberry meadow characterized by a rather open stand of various species of Vaccinium associated with *Pyrus arbutifolia, Pyrus melanocarpa, Kalmia angustifolia, Myrica asplenifolia, Quercus ilicifolia,* and *Amelanchier canadensis.*

That highland known as Great Neck extending from the north to the margin of Worden's Pond is covered by the oak association that characterizes most of the hill land of South County. For the most part a mixture of white, black, red, and scarlet oaks with occasional hickory is the dominant cover. Chestnut tree skeletons, stumps, and sprouts indicate that before the chestnut blight the principal cover was chestnut-oak. Shrub growth is primarily *Kalmia latifolia* and species of Gaylussacia. Representative plants in the ground cover are *Chimaphile maculata, Pyrola americana, Lycopodium complanatum, Cypripedium acaule,* and very thick stands of *Gaultheria procumbens.* At the foot of the hills at the line of mergence with the swamp vegetation, and in those ravines which run into the swamp, the oaks give way to beech, yellow birch, sassafras, and red maple, with an under-story of witch hazel, spice bush, rhododendron, and inkberry.

The "island" where the forces of King Philip were defeated by the colonies is an island only in the sense that it is a small area of land slightly elevated above the surrounding swamp. That this was a location generally above the high water mark, and thus suitable for a permanent campsite, is evidenced by the fact that pitch pine is the dominant tree, although the oldest and largest of the trees perished during the hurricane of 1938. The Indians overlooked the possibility of the pioneers invading their supposedly impregnable fortifications during the winter when progress through the swamp was made relatively easy over the thick ice. There are probably many regions in the Great Swamp today which have been penetrated only during the winter when footing is comparatively secure.

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